Stoller
Grand Junction Office established 1959

GJO-2003-544-TAC

C4238
Log Data Report

Borehole Information:

Borehole: C4238			Site: West Area Entrance		
Coordinates (WA State Plane)		GWL (ft)[1]: 284.5		GWL Date: 12/8/2003	
North	East	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
n/a[3]	n/a	Dec. 2003	n/a	404	Becker

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded steel	0	6 1/4	6	0.12	0	404
Threaded steel	0	9	8	1/2	0	404
The logging engineer measured the casing stickup using a steel tape. The casing thicknesses for both the 6- and 8-in. casings are from a memorandum written by R. McCain dated July 9, 2003. The driller reports each casing is 10 ft long.						

Borehole Notes:

Zero reference is the ground surface. This borehole was logged through the drill pipe. A 1-ft layer of crushed gravel is on the ground surface surrounding the drill site. Groundwater level was measured using an acoustic well probe from top-of-casing. This depth was reported by Tim Hottle, Fluor's drilling supervisor.

The Becker drilling system uses a dual-wall casing. Air flows down the annulus and cuttings are returned inside the inner casing. Total wall thickness is 0.620 in., increasing to 1.115 in. at the casing joints that are present at 10-ft intervals.

Logging Equipment Information:

Logging System:	Gamma 1G		Type: 35% HPGe (34-TP10967A)
Calibration Date:	04/2003	Calibration Reference:	GJO-2003-438-TAR
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Gross Gamma Logging System (GGLS) Log Run Information:

Log Run	1	2	3/Repeat	4	
Date	12/08/03	12/08/03	12/09/03	12/09/03	
Logging Engineer	Spatz	Spatz	Spatz	Spatz	
Start Depth (ft)	404.0	180.0	135.0	94.5	
Finish Depth (ft)	179.0	95.0	95.0	1.0	
Count Time (sec)	N/A[4]	N/A	N/A	N/A	
Live/Real	R	R	R	R	

Log Run	1	2	3/Repeat	4	
Shield (Y/N)	N	N	N	N	
Sample Interval	0.5 ft	0.5 ft	0.5 ft	0.5 ft	
MSA Interval (ft)	N/A	N/A	N/A	N/A	
ft/min	1.0	1.0	1.0	1.0	
Pre-Verification	AG028CAB	AG089CAB	AG029CAB	AG029CAB	
Start File	AG028000	AG028451	AG029000	AG029081	
Finish File	AG028450	AG028621	AG029080	AG029268	
Post-Verification	AG028CAA	AG028CAA	AG029CAA	AG029CAA	
Depth Return Error (in.)	N/A	-1.5	N/A	0	
Comments	No fine-gain adjustment.	Data directory change. No fine-gain adjustment.	Repeat section. Fine-gain adjustment before logging began and after file -050.	Fine-gain adjustment after file -220.	

Logging Operation Notes:

The borehole was logged through drill pipe. Logging through the drill pipe used in the construction of this borehole precludes the acquisition of spectral gamma log spectra that have consistently statistically valid photopeaks.

Gross gamma data were collected using Gamma 1A. Pre- and post-survey verification measurements employed the Amersham KUT (^{40}K, ^{238}U, and ^{232}Th) verifier with serial number 118. Logging was performed with a centralizer installed on the sonde. Zero reference was the ground surface. Maximum logging depth achieved was 404 ft.

Analysis Notes:

Analyst:	Sobczyk	Date:	12/15/03	Reference:	

Pre-run and post-run verification spectra were collected at the beginning and end of the day and compared to the control limits. All of the verification spectra were within the acceptance criteria. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectra as compared to the pre-run verification spectra for each day were between 8 percent higher and 8 percent lower at the end of the day.

Log spectra were processed in batch mode using APTEC SUPERVISOR to determine gross counts, and count rates were calculated in EXCEL. Zero reference was the ground surface. Water and dead time corrections were not applied to the data. The influence of the thick joints is apparent on the total gamma where reduced count rates are exhibited at approximately 10-ft depth intervals.

Log Plot Notes:

Log plots are provided for gross gamma counts per second. Plots of the repeat log versus the original log are included.

Results and Interpretations:

Significant changes in the gross gamma count rates occurred in this borehole. Changes of 50 cps or more occur at approximately 62, 148, and 159 ft. Based upon a review of log spectra, the relatively low count

rates above 62 ft appear to be due to relatively low amounts of ^{40}K, and the increase in total gamma (75 cps) between 148 and 159 ft is primarily due to an increase in ^{232}Th. A decrease in gamma activity occurs at each casing joint, where the increase in wall thickness results in greater attenuation of gamma activity.

The plots of the repeat logs demonstrate reasonable repeatability of the gross gamma logging system (GGLS).

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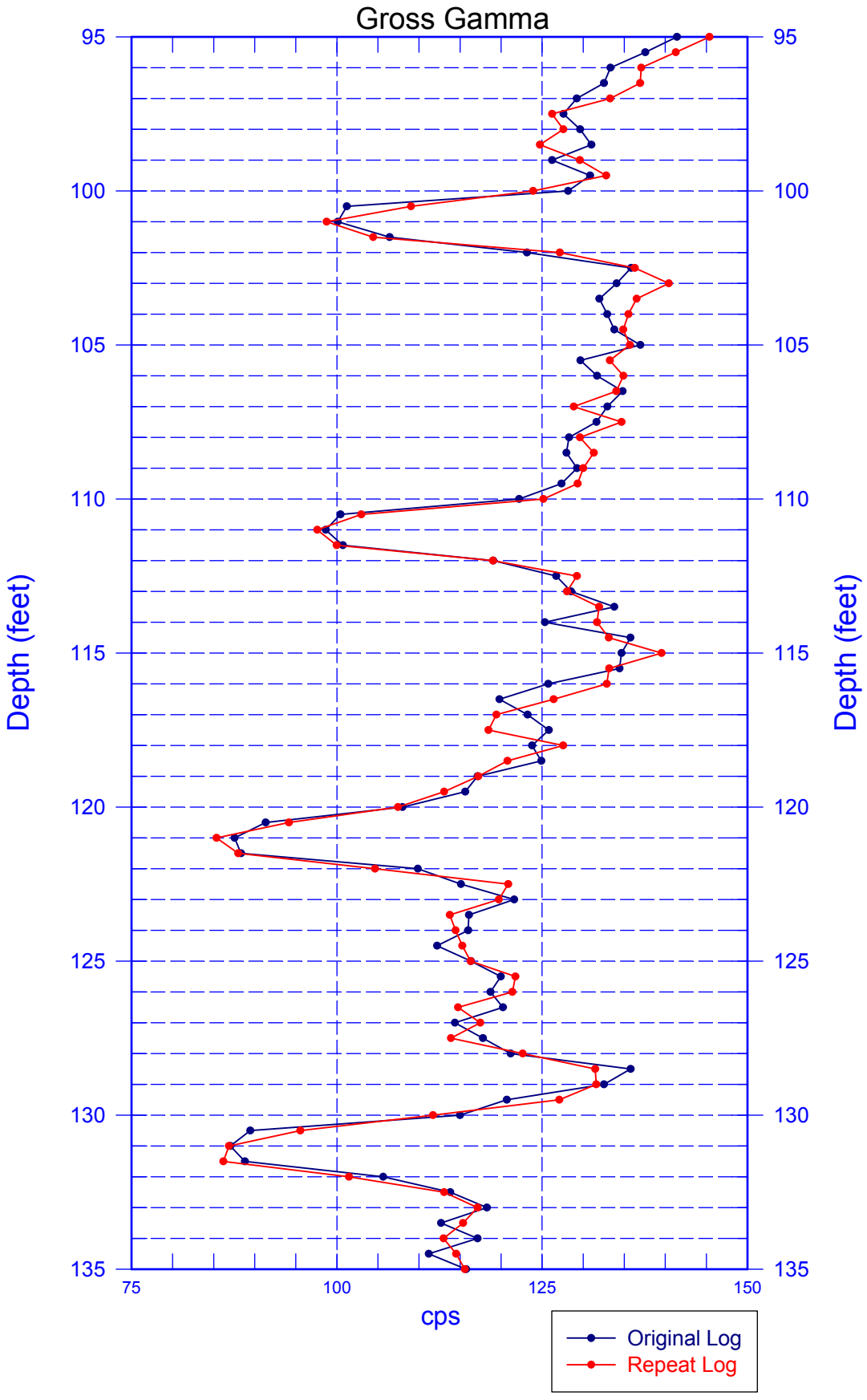
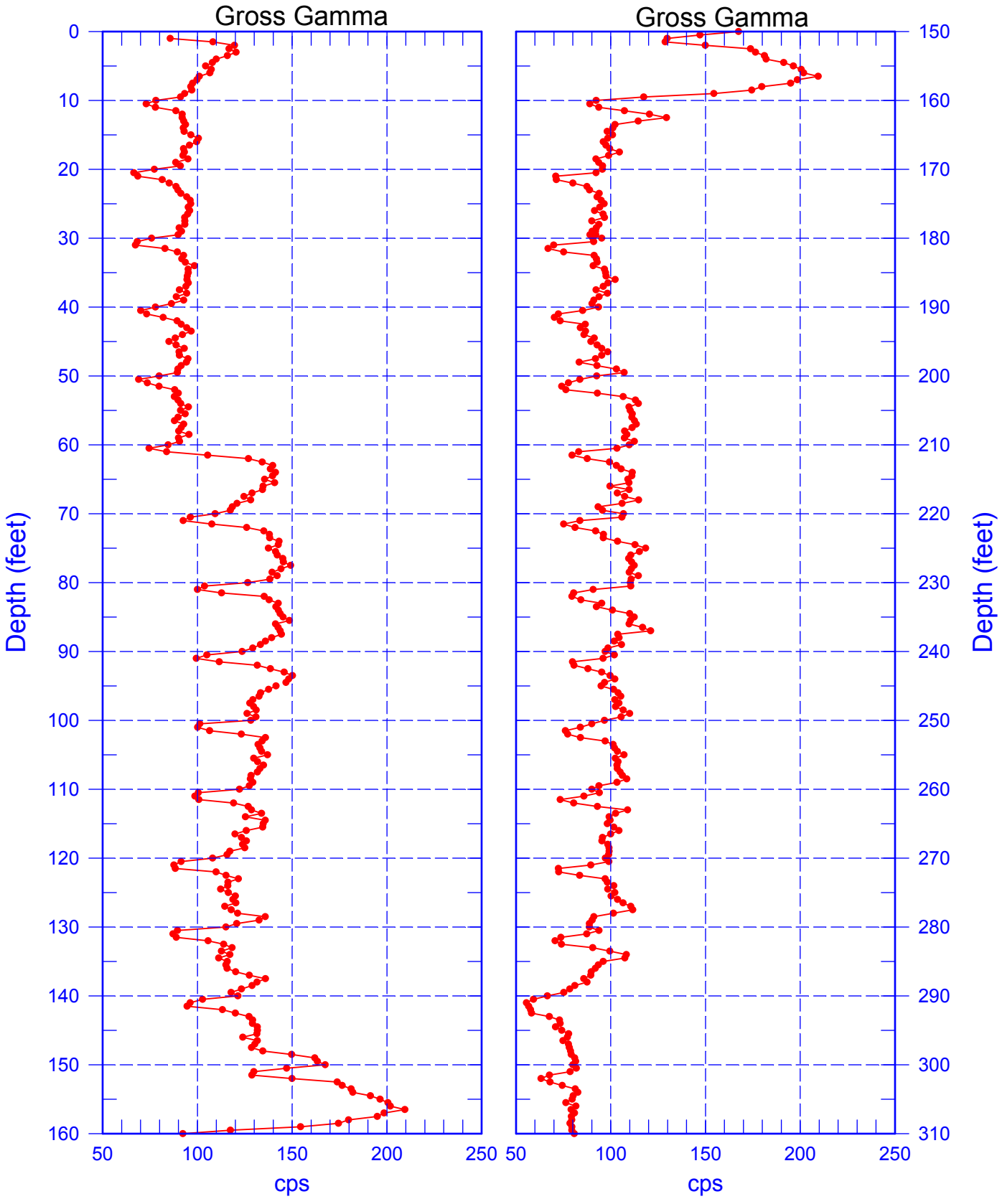
[1] GWL – groundwater level
[2] TOC – top of casing
[3] N/A – not available
[4] n/a – not applicable

C4238

Rerun of Gross Gamma Log (135.0 to 95.0 ft)



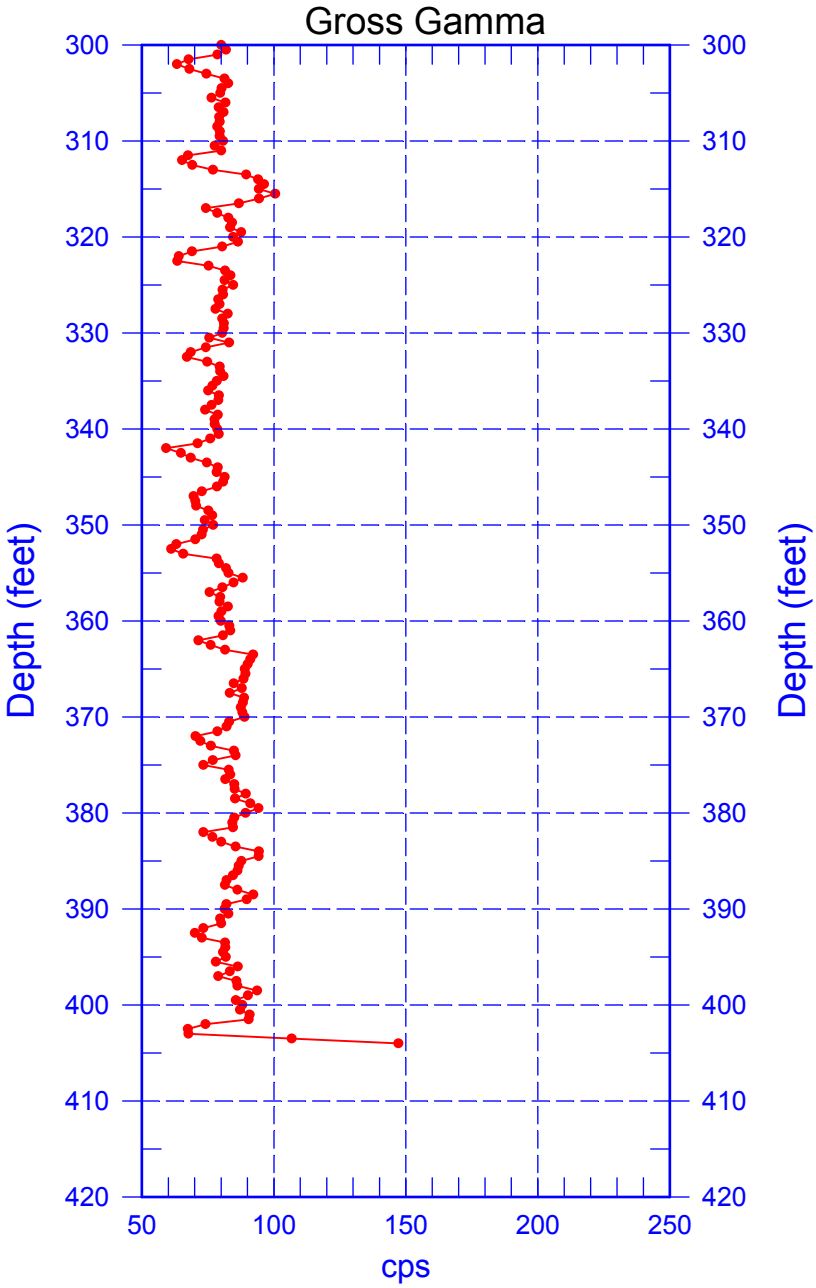
C4238



Zero Reference = Ground Surface

Date of Last Logging Run
12/09/2003

C4238



Zero Reference = Ground Surface

Date of Last Logging Run
12/09/2003